CLAIMS

1. (Currently Amended) A method for focusing [an] a Synthetic Aperture Radar image having features and a center, said image formed from digitized returns, each of said digitized returns having a phase and an amplitude, said returns generated from separate pulses transmitted from a plurality of locations, comprising the steps of:

storing said digitized returns forming said image in a memory, said returns acquired in an azimuth and a range coordinate system;

searching within said memory for returns descriptive of said features;

computing a coarse range and coarse range rate of the center of said image from the change in position of said features within said azimuth and said range coordinate system;

motion compensating said digitized returns forming said image using said coarse range and coarse range rate to form a coarse image;

polar format converting said digitized returns forming said coarse image from said azimuth and range coordinate system into an orthogonal Cartesian coordinate system where said digitized returns are adjusted in phase and amplitude to form an evenly spaced image data within said orthogonal Cartesian coordinate system;

autofocusing said evenly space image data to obtain a focused image;

computing a fine range and fine range rate from features contained within said focused image;

converting said fine range and said fine range within said orthogonal Cartesian coordinate system for use within said azimuth and range coordinate system and motion compensating said digitized returns using said fine range and said fine range rate;

iterating said motion compensating step and said subsequent steps using said fine range and said fine range rate until said attributes of said focus quality reach a predefined level.

2. (Original) A method as described in claim 1 wherein said autofocusing generates a phase error, said phase error converted to an adjustment to said fine range, said adjustment fed back to said motion compensating step.

3. (Original) A method as described in claim 1 wherein a range pre-filter is applied to said coarse image obtained from said motion compensating step.

4. (Original) A method as described in claim 1 wherein an azimuth pre-filter is applied to said coarse image obtained from said motion compensating step.

5. (Original) A method as described in claim 1 wherein said orthogonal Cartesian coordinate system minimizes errors from subsequent application of two dimensional Fourier transforms to said image data.

6. (Original) A method as described in claim 2 wherein said adjustment is used within said polar format step.